KRAMER ELECTRONICS, Ltd.

USER MANUAL

Distribution Amplifiers:

Models: VM-1110, VM-1610, VM-5AD, VM-80A

IMPORTANT: Before proceeding, please read paragraph entitled "Unpacking and Contents"

Table Of Contents

Section	Name	Page
1	INTRODUCTION	2
1.1	A Word On Distribution Amplifiers	2
1.2	Factors Affecting Quality of Results	2
2	SPECIFICATIONS	3
3	How do I Get Started?	4
4	UNPACKING AND CONTENTS	4
4.1	Optional Accessories	4
5	VM SERIES AMPLIFIERS	5
5.1	Getting to Know Your VM-1110 Amplifier	5
5.2	Getting to Know Your VM-1610 Amplifier	6
5.3	Getting to Know Your VM-5AD Amplifier	7
5.4	Getting To Know Your VM-80A Amplifier	9
6	INSTALLATION	9
6.1	Rack Mounting	9
7	Connecting to Audio Devices	9
8	USING THE VM AUDIO AMPLIFIERS	9
8.1	Powering On the Amplifier	9
8.2	Coupling	9
8.3	Audio Control (VM-1610/80A Only)	9
8.4	Balanced\Stereo Control (VM-5AD Only)	9
8.4.1	Using A Microphone	10
8.5	Programming the VM-1110 and VM-1610	10
8.6	Programming the VM-80A	10
8.7	Audio System Setup	10
9	TAKING CARE OF YOUR AUDIO AMPLIFIER	11
10	TROUBLESHOOTING	11
10.1	Power and Indicators	12
10.2	Audio Signal	13

List Of Illustrations

Figure		Page
1	VM-1110 Front/Rear Panel Features	5
2	VM-1610 Front/Rear Panel Features	6
3	VM-5AD Front/Rear Panel Features	7
4	VM-80A Front/Rear Panel Features	8
5	Audio System Setup	11

List Of Tables

Table		
1	VM-1110 Front/Rear Panel Features	5
2	VM-1610 Front/Rear Panel Features	6
3	VM-5AD Front/Rear Panel Features	7
4	VM-80A Front/Rear Panel Features	8

1 INTRODUCTION

Congratulations on your purchase of this Kramer Electronics amplifier. Since 1981 Kramer has been dedicated to the development and manufacture of high quality video/audio equipment. The Kramer line has become an integral part of many of the best production and presentation facilities around the world. In recent years, Kramer has redesigned and upgraded most of the line, making the best even better. Kramer's line of professional video/audio electronics is one of the most versatile and complete available, and is a true leader in terms of quality, workmanship, price/performance ratio and innovation. In addition to the Kramer line of high quality amplifiers, such as the one you have just purchased, Kramer also offers a full line of high quality switchers, processors, interfaces, controllers and computer-related products. This manual includes configuration, operation and information for the following products from the Kramer VM line of distribution amplifiers. All these VM amplifiers are similar in operation and features.

- **VM-1110** – 1:10 Balanced Mono or 2x5 Stereo Audio Distributor
- **VM-1610** – 1:10 or 2x1:5 Balanced Stereo Audio Distributor
- **VM-5AD**- 1:5 Balanced Mono/Unbalanced Stereo Audio Distributor
- **VM-80A**- 1:8 or 2x 1:4 Balanced Stereo Audio Distributor

1.1 A Word On Distribution Amplifiers

Distribution amplifiers are used to distribute one source to several acceptors for simultaneous recording or monitoring of one source, with no discernible signal degradation. They vary in the number of inputs, programming capability, number of outputs and operating format. A good quality distribution amplifier amplifies the incoming signal, pre-compensates the signal for potential losses (resulting from the use of long cables, noisy source, etc.) and generates several identical buffered and amplified outputs. Often, a signal processor is inserted between the source and the distribution amplifier for correction and fine-tuning of the source signal before multiplication, so that all outputs are corrected in the same way.

1.2 Factors Affecting Quality of Results

There are many factors affecting the quality of results when signals are transmitted from a source to an acceptor:

- Connection cables - Low quality cables are susceptible to interference, they degrade signal quality and cause elevated noise levels. They should therefore be of the best quality.
- Sockets and connectors of the sources and acceptors - So often ignored, they should be of highest quality, since "Zero Ohm" connection resistance is the target. Sockets and connectors also must match the required impedance (75 ohms in video). Cheap, low quality connectors tend to rust, thus causing breaks in the signal path.
- Amplifying circuitry - Must have quality performance when the desired end result is high linearity, low distortion and low noise operation.
- Distance between sources and acceptors - Plays a major role in the final result. For long distances (over 15 meters) between sources and acceptors, special measures should be taken in order to avoid cable losses. These include using higher quality cables or adding line amplifiers.
- Interference from neighboring electrical appliances - These can have an adverse effect on signal quality. Balanced audio lines are less prone to interference, but unbalanced audio should be installed far from any mains power cables, electric motors, transmitters, etc. even when the cables are shielded.

2 SPECIFICATIONS

	VM-1110	VM-1610	VM-5AD	VM-80A
Configuration	1:10 or 2x1:5	1:10 or 2x1:5	1:5	1:8 or 2x1:4
Input Type	2 balanced audio	2 stereo balanced audio	1 audio-balanced mono, or unbalanced stereo. MIC state: 1 balanced mono Mic or unbalanced stereo Mic - 5mV/10kohm.	2 stereo audio balanced
Input Connections	Female XLR connectors	Terminal block connectors	Female XLR connectors	Terminal block connectors
Input Level	+4dBm 50kohm	Up to +24dBm/50Kohm	Up to 18Vpp/50Kohm MIC state: 5mV/10kohm	+4dBm, 100kohm
Output Type	10 balanced audio (5 stereo balanced audio)	10 (or 2x5) stereo balanced audio	5 mono balanced or stereo unbalanced audio	8 (or 2 x 4) stereo balanced audio
Output Connector	Male XLR connectors	Terminal block connectors	Male XLR connectors	Terminal block connectors
Output Level	+4dBm/50ohm	Up to +24dBm/50ohm	Up to 20Vpp/50ohm	+4dBm, 49ohm
Output Coupling	AC	AC	AC	AC
Audio S/N Ratio	>95dB@1Vpp	>92dB@1Vpp	>88dB@1Vpp	100dB@1Vpp
Audio Bandwidth	10-100kHz, -3dB	10-100kHz, -3dB	10-80kHz, -3dB	10-20kHz, -1dB
Channel Matching	60dB	60dB	>60dB	-65dB
Max audio Output	>20Vpp	26Vpp	20Vpp	20Vpp
Audio THD	<0.1% at 1kHz	<0.011% at 1kHz	0.011% at 1kHz	<0.02% at 1kHz
Gain Range	0.5 to 9.4dB	0.5dB to 9.5dB	15.5dB to 35.6dB	0.2 to 5.8dB
Crosstalk	-62dB	-84.5dB	NA	-60dB
Controls	Front selector switches for 1:10 or 2x1:5 operation	Front panel selectors for 1:10 or 2x1:5 operation(4 trimmers - two for each input channel)	Front panel stereo/balance and Mic/line pushbuttons	Front panel selectors for 1:8, 2x1:4, operation, 4 front accessible balanced gain trimmers
Dimensions (W, D, H)	48.3 x 17.8 x 4.5(cm) 19" x 7" x 1U	48.3 x 17.8 x 4.5(cm) 19" x 7" x 1U	24.5 x 18 x 4.5 (cm) 9.6" x 7" x 1.8"	22 x 18 x 4.5 (cm) 8.7 " x 7" x 1.8"
Weight	2.5 kg (5.5 lbs.) Approx.	2.6 kg (5.7 lbs.) Approx.	1.2kg. (2.7 lbs.) Approx.	1.2kg. (2.7 lbs.) Approx.
Power Consumption	3.2VA	21VA	3.4VA	6.7VA
Power Source	230/115VAC, 50/60Hz(115V U.S.A.)	230/115VAC, 50/60Hz(115V U.S.A.)	230/115VAC, 50/60Hz(115V U.S.A.)	230/115VAC, 50/60Hz(115V U.S.A.)

3 HOW DO I GET STARTED?

The fastest way to get started is to take your time and do everything right the first time. Taking 15 minutes to read the manual may save you a few hours later. You don't even have to read the whole manual, focus on the relevant sections.

4 UNPACKING AND CONTENTS

The items contained in your Kramer VM amplifier package are listed below. Please save the original box and packaging materials for possible future transportation and shipment of the amplifier.

- Amplifier
- AC power cable
- User manual
- Rubber feet
- Kramer concise product catalog

4.1 Optional Accessories

The following Kramer accessories can enhance implementation of your amplifier.

- **Rack Adapter -** Used to install smaller size machines in a standard 1U rack. One or more machines may be installed on each adapter.
- **SP-4200** - (Audio ProcAmp) - can be serially connected between a VM- amplifier and the audio source for noise reduction sound improvement. The machine provides full stereo signal processing as follows: Noise Reduction by up to 25dB from any source without sonic artifacts, downward audio expansion, dynamically adjusting adaptive threshold for all-level operation, effective Dolby $B^{(R)}$ decoding, AGC operation and level transcoding.
- **FC-4208 -** (Balanced/Unbalanced Audio Transcoder) can be serially connected between a VM-amplifier and the audio source for audio conversion of different formats. The machine is a bi-directional Transcoder between two popular audio formats. It allows gain or attenuation while transcoding to compensate for the 14dB change between IHF audio levels and the newly adopted, balanced DAT input levels. Very low noise and distortion components are used throughout.

5 VM SERIES AMPLIFIERS

This section describes all the controls and connections of your amplifier. Understanding all of the controls and connections helps you realize its full power.

5.1 Getting to Know Your VM-1110 Amplifier

The KRAMER **VM-1110** is a full spec, state-of-the-art, 1:10 balanced audio distribution amplifier designed for studio and other demanding applications. The **VM-1110** splits the input source into ten identical outputs with no discernible signal degradation. The **VM-1110** has two inputs and can be programmed by the user to function as a 1:10 Mono DA or as a 2 x 1:5 (stereo) DA. State-of-the-art Bi-Fet amplifying circuitry and a high power discrete buffering system make the **VM-1110** an excellent performer. All circuitry is active with no transformers thus ensuring hum-free, full bandwidth operation. The **VM-1110** may also be used to distribute unbalanced signals, using an appropriate adapter and grounding the negative polarity signal. Two **VM-1110** machines can be used for 1:10 stereo operation, in conjunction with the KRAMER **VM-1010** (used for video).
Front/rear panel features of the **VM-1110** are described in Figure 1 and
Table 1.

NOTE
For operation instructions refer to section 8.

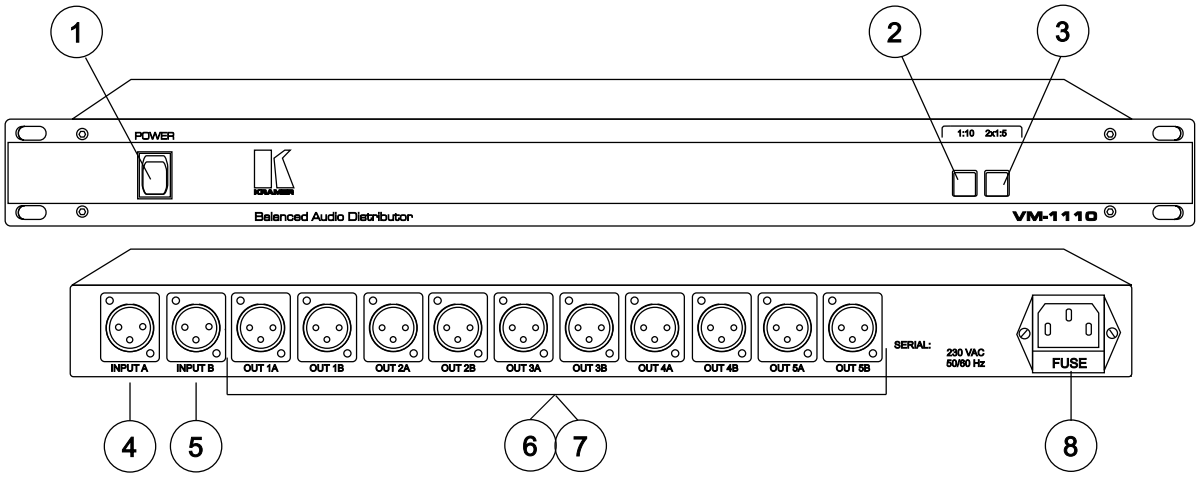

Figure 1: VM-1110 Front/Rear Panel Features

Table 1: VM-1110 Front/Rear Panel Features

No.	Feature	Function
1.	Illuminated power switch	Supplies power to the unit.
2.	Mode 1:10 pushbutton (Illuminates when pushed)	Splits input "A" to all 10 outputs when pressed.
3.	Mode 2 x1:5 pushbutton (Illuminates when pushed)	Splits inputs "A" and "B" to outputs "1A-5A" and "1B-5B" respectively when pressed.
4.	XLR INPUT A female connector	Audio input
5.	XLR INPUT B female connector	Audio input
6.	XLR OUT 1A-5A male connectors	5 amplified and buffered audio outputs.
7.	XLR OUT 1B-5B male connectors	5 amplified and buffered audio outputs.
8.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.2 Getting to Know Your VM-1610 Amplifier

The KRAMER **VM-1610** is a full spec, state-of-the-art, 1:10 balanced stereo audio distribution amplifier designed for studio and other demanding applications. The **VM-1610** has two inputs and can be programmed by the user to function as a 1:10 or as a 2 x 1:5 DA. State-of-the-art Bi-Fet amplifying circuitry and a high power discrete buffering system make the **VM-1610** an excellent performer. All circuitry is active with no transformers thus ensuring hum-free and full bandwidth operation. Front/rear panel features of the **VM-1610** are described in Figure 2 and Table 2.

NOTE

For operation instructions refer to section 8.

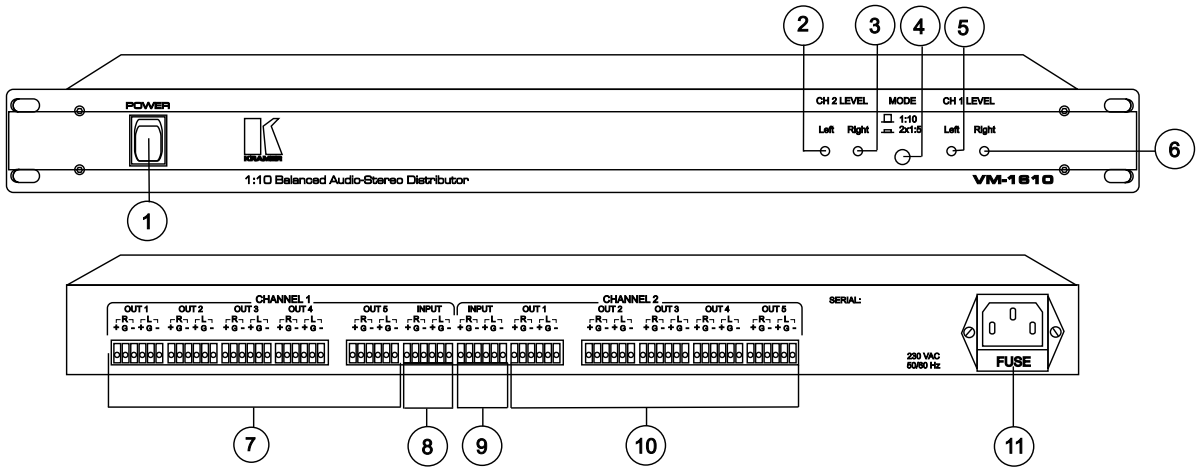

Figure 2: VM-1610 Front/Rear Panel Features

Table 2: VM-1610 Front/Rear Panel Features

No.	Feature	Function
1.	Illuminated **power** switch	Supplies power to the unit.
2.	**CH 2 LEVEL (Left)** Gain trimmer	Controls the left channel audio gain (the machine is factory preset for accurate 1:1 signal transparency).
3.	**CH 2 LEVEL (Right)** Gain trimmer	Controls the Right channel audio gain (the machine is factory preset for accurate 1:1 signal transparency).
4.	**MODE 1:10/2x1:5** selector	➢ **1:10** (released): Splits channel "**1**" input to all 10 outputs. ➢ **2x1:5** (pressed): Splits channel "**1**" and channel "**2**" " to outputs "**1-5**" of channels "**1**" and "**2**" respectively.
5.	**CH 1 LEVEL (Left)** Gain trimmer	Controls the left channel audio gain (the machine is factory preset for accurate 1:1 signal transparency).
6.	**CH 1 LEVEL (Right)** Gain trimmer	Controls the Right channel audio gain (the machine is factory preset for accurate 1:1 signal transparency).
7.	**CHANNEL 1 OUT 1-5 (L,R)** terminal block connector	5 amplified and buffered audio outputs.
8.	**CHANNEL 1 INPUT (L,R)** terminal block connector	Stereo audio balanced input.
9.	**CHANNEL 2 INPUT (L,R)** terminal block connector	Stereo audio balanced input.
10.	**CHANNEL 2 OUT 1-5 (L,R)** terminal block connector	5 amplified and buffered audio outputs.
11.	A 3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.3 Getting to Know Your VM-5AD Amplifier

The KRAMER **VM-5AD** is a full spec, state-of-the-art, 1:5 balanced audio distribution amplifier designed for studio and other demanding applications. The **VM-5AD** splits a single input source, either mono balanced or stereo unbalanced into five identical outputs without any discernible signal degradation. The **VM-5AD** has an audio level control knobs to change balanced or unbalanced audio signal levels, it can accept microphone input level, balanced mono or unbalanced stereo, amplifying it to a line level signal. The **VM-5AD** allows easy conversion between balanced and unbalanced signals for maximal flexibility in studios. All circuitry is active with no transformers, thus ensuring hum-free, full bandwidth operation. The **VM-5AD** may be used to convert balanced signal levels and unbalanced signal levels in both directions, using the level knobs. A microphone signal (balanced/unbalanced) may be converted to a standard +4dBm balanced level. Front/rear panel features of the **VM-5AD** are described in Figure 3 and Table 3.

NOTE

For operation instructions refer to section 8.

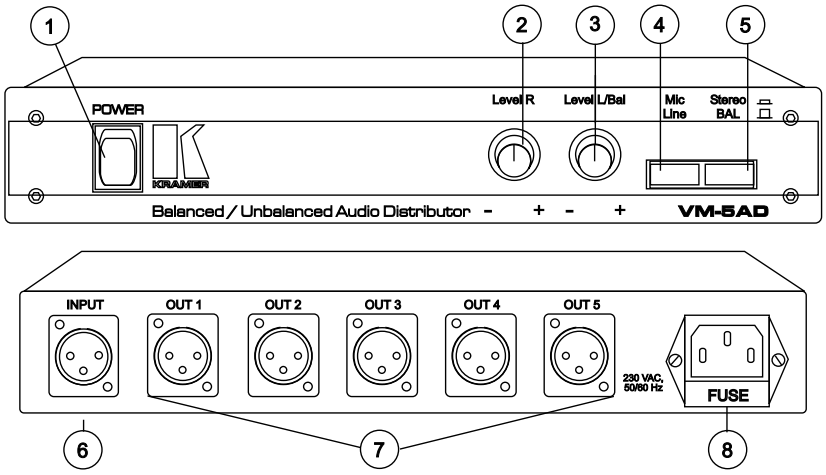

Figure 3: VM-5AD Front/Rear Panel Features

Table 3: VM-5AD Front/Rear Panel Features

No.	Feature	Function
1.	Illuminated **Power** Switch	Supplies power to the unit.
2.	**LEVEL R** knob	Adjusts right stereo audio level when **Stereo/BAL** pushbutton is in "**Stereo**" position.
3.	**LEVEL L/BAL** knob	1. Adjusts left stereo audio level when **Stereo/BAL** pushbutton is in "Stereo" position. 2. Adjusts balanced audio level when **Stereo/BAL** is in "**BAL**" position.
4.	**Mic/Line** pushbutton**.**	1. Should be pressed ("Mic" position) whenever microphone is used. 2. Should be released ("Line" position) for normal operation (no microphone).
5.	**Stereo/BAL** pushbutton	1. Enables stereo signal and should be pressed ("**Stereo**" position) when a stereo signal is applied to the input. 2. Enables balanced signal and should be released ("**Bal**" position) when a balanced signal is applied to the input.
6.	XLR **INPUT** female connector	Audio input
7.	XLR **OUT1- OUT5** male connectors	5 amplified and buffered audio outputs.
8.	3-prong power connector/fuse	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

5.4 Getting To Know Your VM-80A Amplifier

The KRAMER **VM-80A** is a Broadcast quality, state-of-the-art, balanced stereo audio distribution amplifier designed for demanding applications, such as broadcast and production studios. The **VM-80A** has two balanced stereo audio inputs, each splitting the input source into four identical outputs. The **VM-80A** can function as a 1:8 DA or as two 1:4 DAs. It has trimmers on the front panel to fine tune levels of each channel individually. Units in the 80 series come in a convenient, compact size enclosure. Any two units fit side by side in a 19" rack using a special 1U-rack adapter. To achieve a larger distribution system, the inputs of several machines may be looped by a parallel connection. For signal enhancement and noise reduction, an audio signal processor may be inserted. Front/rear panel features of the **VM-80A** are described in Figure 4 and Table 4.

NOTE

For operation instructions refer to sections 8.1, 8.6.

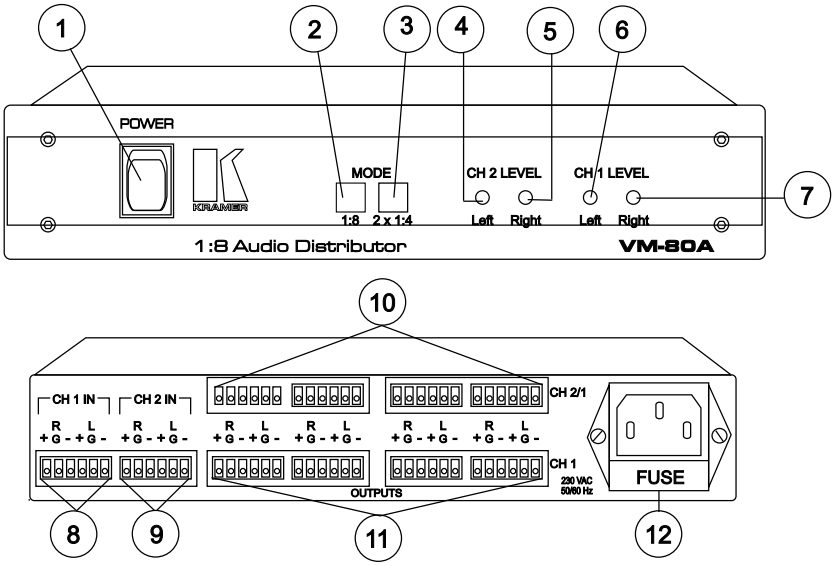

Figure 4: VM-80A Front/Rear Panel Features

Table 4: VM-80A Front/Rear Panel Features

No.	Feature	Function
1.	Illuminated **Power** Switch	Supplies power to the unit.
2.	**1:8** operating mode touch switch (Illuminated when pressed)	Splits channel "**1**" input to all 8 outputs (channels "**1**"&"**2**")when pressed.
3.	**2x1:4** operating mode touch switch (Illuminated when pressed)	Splits channels "**1**"&"**2**" inputs to output channels "**1**"&"**2**" respectively when pressed.
4.	**CH 2 LEVEL Left** trimmer	Controls Channel "**2**" (left) audio gain.
5.	**CH 2 LEVEL Right** trimmer	Controls Channel "**2**" (Right) audio gain.
6.	**CH 1 LEVEL Left** trimmer	Controls Channel "**1**" (left) audio gain.
7.	**CH 1 LEVEL Right** trimmer	Controls Channel "**1**" (Right) audio gain.
8.	**CH 1 IN (L,R)** terminal block connector	Stereo audio balanced input.
9.	**CH 2 IN (L,R)** terminal block connector	Stereo audio balanced input.
10.	**CH 2/1 OUTPUTS (L,R)** terminal block connectors	Amplified and buffered audio outputs.
11.	**CH 1 OUTPUTS (L,R)** terminal block connectors	Amplified and buffered audio outputs.
12.	Power Connector	A 3-prong AC connector allows power to be supplied to the unit. Directly underneath this connector, a fuse holder houses the appropriate fuse.

6 INSTALLATION

6.1 Rack Mounting

The **VM-1110** and **VM-1610** amplifiers may be rack mounted in a standard 19" EIA rack assembly, and include rack "ears" at the ends of the front panel. Each of these devices uses one unit (1U) of rack height, 1.75", and does not require any specific spacing above or below the unit for ventilation. To mount these amplifiers, simply place the unit against the rails of your rack, and insert standard screws through each of the four corner holes in the rack ears. The **VM-80A** and **VM-5AD** amplifiers require a special (see section 4.1) rack adapter (contact your KRAMER dealer) to be mounted in the 1U rack. For installation of the **VM-80A** and **VM-5AD,** follow the instructions, in the installation guide, enclosed with the adapter.

7 CONNECTING TO AUDIO DEVICES

Audio sources and output devices (such as amplifiers or recorders) may be connected to the amplifier through the female XLR type connectors (**VM-1110** and **VM-5AD** models), or through terminal block type connectors (**VM-1610** and **VM-80A** models) located at the back of the machine.

8 USING THE VM AUDIO AMPLIFIERS

8.1 Powering On The Amplifier

NOTES

1. *The amplifier should only be powered on after all connections are completed and all source devices have been powered on. Do not attempt to connect or disconnect any audio or control signals to the amplifier while it is powered on!*
2. *The socket-outlet should be near the equipment and should be easily accessible. To fully disconnect equipment, remove power cord from its socket after turning it off.*

1. Press the toggle switch (on the far-left of the front panel) to the up position. The toggle switch illuminates and the configuration button illuminates as well (where applicable).
2. Operate the acceptors.

8.2 Coupling

The coupling implemented in the amplifiers described in this manual is AC.

8.3 Audio Control (VM-1610/80A Only)

Using a flat screwdriver, gently adjust the **GAIN** trimmers of the appropriate **RIGHT** or **LEFT** channels, located at the front of the machine, for satisfactory audio level.

8.4 Balanced\Stereo Control (VM-5AD Only)

Balanced audio is a signal that is divided into two antiphase signals, traveling on two wires (and sometimes with a third - a ground reference wire). Transmitting a balanced signal achieves a better signal-to-noise ratio, and the signal is more immune to noise and interference. On the receiving end there is a differential amplifier, which amplifies only the difference between the antiphase signals, thus canceling noise which is picked up along the way. The balanced system is usually used either when very low signals are to be transmitted over long distances (such as those generated from high quality microphones) or at broadcast audio studios, for highest quality signal recreation. To enable stereo audio control, select the "**Stereo**" position by pressing the **Stereo/BAL** pushbutton to the "**In**" position. Then gently adjust the **Level R/Level L** Gain knobs to control the appropriate channel audio gain for satisfactory audio level. To enable balanced audio level control, select "**BAL**" position by releasing the **Stereo/BAL** pushbutton to the "**Out**" position. Then using the **LEVEL L/BAL** knob gently adjust the audio stereo level for satisfactory audio level.

8.4.1 Using A Microphone

A microphone is a device which converts sound waves to electrical impulses. High quality microphones usually generate a very low signal level. Low noise, high fidelity pre-amplification is required to boost the output of a microphone before the signal reaches the main audio amplifier where it is processed as a regular audio signal. Pre-amplifying low level microphone signals is achieved by precise matching of microphone impedance and use of low noise electronic amplifying devices. In order to obtain the highest quality output signal from a microphone, its internal impedance should be matched to that of a pre-amplifier with exactly the same input impedance. Microphone impedance may vary from a few ohms to several mega-ohms.
When a microphone is used/not used, perform the following steps:

1. Press the **Mic/Line** pushbutton located at the front of the machine, to switch to "**Mic"** position. This is done in order to compensate for microphone low input level.
2. Release **Mic/Line** pushbutton (no microphone) in normal operation ("**Line**" position).

8.5 Programming The VM-1110 and VM-1610

The mode of operation (programming) is selected by activating one of the **1:10, 2x1:5,** operating mode switches. These programming switches illuminate as the selection is made and function as follows:

- **1:10** position - splits channel "**1**" Input (VM-1610) or input "**A**" (VM-1110) to all 10 outputs.
- **2x1:5** position - splits channel "**1**" and channel "**2**" inputs " to outputs "**1-5**" of channels "**1**" and "**2**" respectively (VM-1610). Or: Splits input "**A**" and input "**B**" " to outputs "**1A-5A**" and "**1B-5B**" respectively (VM-1110).

1. Connect a balanced audio source to the input sockets located on the rear panel of the machine, using the appropriate cables and connectors and noting the correct polarity (+/-) of the input signal.
2. Connect up to 10 acceptors to the output sockets, using the appropriate cables and connectors.
3. Operate source, acceptors and the VM-1110/1610.
4. Use the **1:10, 2x1:5**, operating mode switches to select the desired mode of operation.
5. When in stereo mode, connect each channel to the appropriate inputs and outputs and select **2x1:5** mode of operation.

8.6 Programming The VM-80A

The VM-80A mode of operation can be selected by pressing one of the **1:8, 2x1:4** operating mode switches. These programming switches illuminate as the selection is made and function as follows:

- **1:8** position - splits channel "**1**" input to all 8 outputs (channels "**1**"&"**2**") when pressed.
- **2x1:4** position - splits channels "**1**"&"**2**" inputs to output channels "**1**"&"**2**" respectively when pressed.

1. Connect a balanced stereo audio source to the terminal blocks located on the rear panel of the machine, using the appropriate cables and connectors and noting the correct polarity (+/-) of the input signal.
2. Connect up to 8 acceptors to the output sockets, using the appropriate cables and connectors and noting the correct polarity.
3. Operate source, acceptors and the VM-80A.
4. Use the **1:8** or the **2x1:4** operating mode switches to select the desired mode of operation.

8.7 Audio System Setup

In broadcast and in high quality industrial studios, audio signals are of the balanced type. In order to distribute balanced audio signals, a balanced audio source is needed. Figure 5 illustrates a typical usage of a balanced audio amplifier.
Perform the following steps if necessary):

1. Connect the audio source to the balanced audio DA (VM-5AD for example).
2. Connect the audio acceptors to the output sockets of the balanced DA.
3. Use the controls of the DA (if available) to adjust signal levels (see sections 8.3 and 8.4 for more details).

Some useful tips:

- Use two mono Das as one stereo balanced DA.
- Use a dual channel DA (VM-1110 for example) for maximal studio flexibility.
- Do not use excessively long cables if possible, as signal quality may degrade rapidly. Use best cables and connectors (XLRs).
- You may feed a balanced DA with an unbalanced signal via a Transcoder (FC-4208 for example).

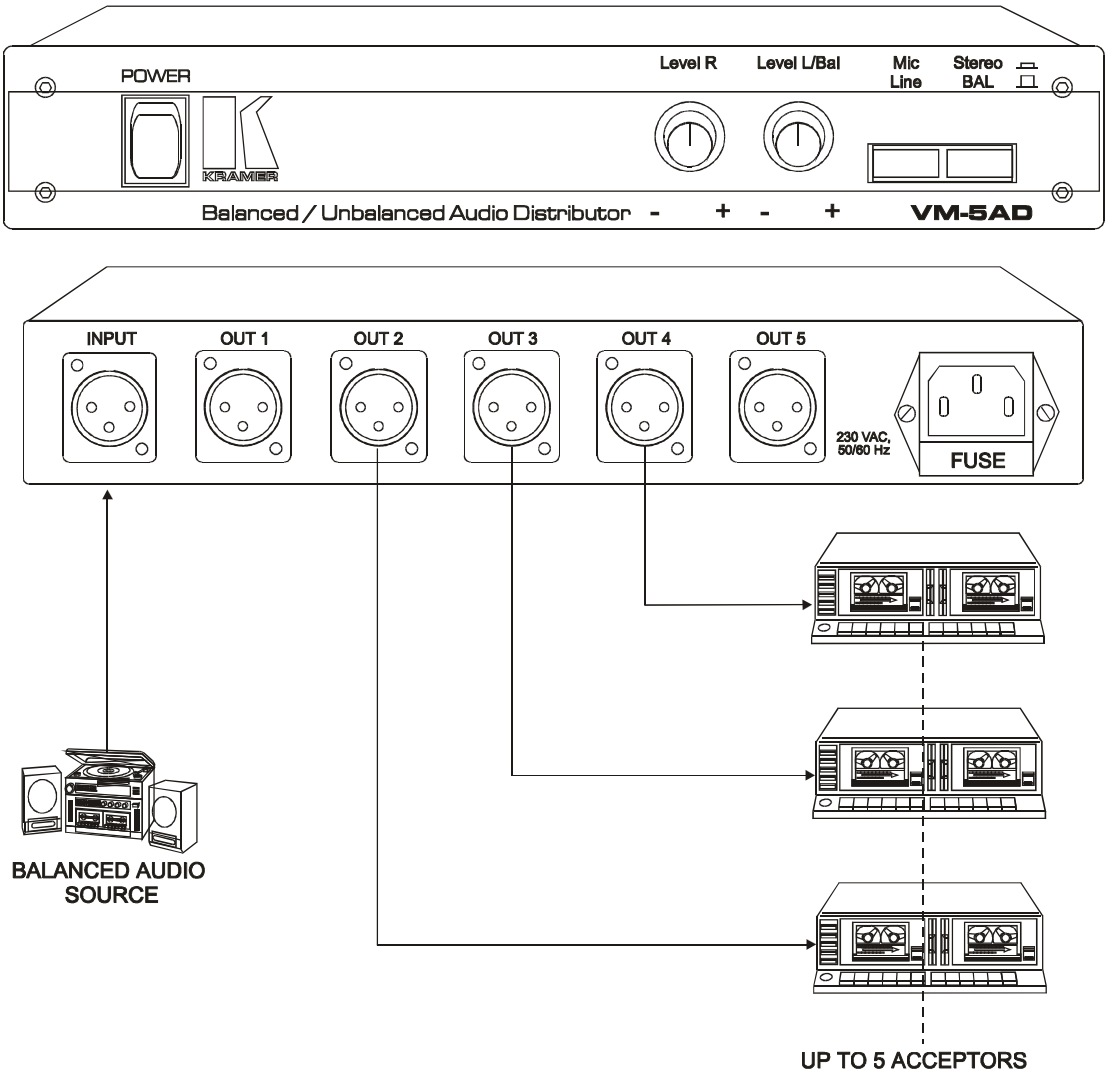

Figure 5: Audio System Setup

9 TAKING CARE OF YOUR AUDIO AMPLIFIER

Do not locate your amplifier in an environment where it is susceptible to dust or moisture. These may damage the electronics, and cause erratic operation or failure. Do not locate your amplifier where temperature and humidity may be excessive. Do not clean your amplifier with abrasives or strong cleaners. Doing so may remove or damage the finish, or may allow moisture to build up. Take care not to allow dust or particles to build up inside unused or open connectors.

10 TROUBLESHOOTING

NOTES

1. *Please note that if the output signal is disturbed or interrupted by very strong external electromagnetic interference, it should return and stabilize when such interference ends. If not, turn the power switch off and on again to reset the machine.*
2. *If the recommended actions still do not result in satisfactory operation, please consult your KRAMER Dealer.*

10.1 Power And Indicators

Problem	Remedy
No Power	1. Confirm that the rocker switch is in the "ON" position, and that the Power lamp is illuminated. 2. Confirm that power connections are secured at the amplifier and at the receptacle. Make sure the receptacle is active, outputting the proper mains voltage. 3. If there is still no power, check the fuse. Remove power cord from the AC outlet and from the machine and then, using a flat head screwdriver, remove the fuse holder located directly below the power connector. Confirm that the fuse is good by looking at the wire connected to the ends of the fuse. If the wire is broken, replace the fuse with another, with the same value.

10.2 Audio Signal

Problem	Remedy
No audio at the output device, regardless of input selected	1. Confirm that your sources and output device are powered on and connected properly. Audio signals connected to the input of your amplifier should be properly wired to the output of your source. Audio signals connected to the output of your amplifier should be properly wired to the input of your amplifier or recorder. 2. Confirm that any other amplifiers in the signal path have the proper input and/or output selected.
Audio level is too low	1. Confirm that the connecting cables are of high quality and properly built. Take special care in noting the wiring configuration of balanced to unbalanced cables. 2. Verify that both of the antiphase wires of the balanced audio inputs and outputs are properly connected. 3. Check level controls located on your source input device or output display or recorder.

Problem	Remedy
Low frequency hum in the output signal	60Hz hum (ground loop) is caused by a difference in the ground potential of any two or more devices connected to your signal path. This difference is compensated by passing that voltage difference through any available interconnection, including your audio cables. **WARNING!** **DO NOT DISCONNECT THE GROUND FROM ANY PIECE OF AUDIO EQUIPMENT IN YOUR SIGNAL PATH!** Check the following to remove ground loops: 1. Confirm that all interconnected equipment is connected to the same phase of power, if possible. 2. Remove equipment connected to that phase that may introduce noise, such as motors, generators, etc. 3. Disconnect all cables and reconnect them one at a time until the ground loop reappears. Disconnect the affected cable and replace, or insert an isolation device (opto isolator or transformer) in the signal path.

LIMITED WARRANTY

Kramer Electronics (hereafter Kramer) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for three year from the date of the first customer purchase.

WHO IS PROTECTED

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site **www.kramerelectronics.com**.
2. Any product, on which the serial number has been defaced, modified or removed.
3. Damage, deterioration or malfunction resulting from:
    a. Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature.
    b. Product modification, or failure to follow instructions supplied with the product.
    c. Repair or attempted repair by anyone not authorized by Kramer.
    d. Any shipment of the product (claims must be presented to the carrier).
    e. Removal or installation of the product.
    f. Any other cause, which does not relate to a product defect.
    g. Cartons, equipment enclosures, cables or accessories used in conjunction with the product.

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

Kramer's liability for any defective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

NOTICE

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47	FCC Rules and Regulations: Part 15- "Radio frequency devices: Subpart B- Unintentional radiators

CAUTION

- ***Any user who makes changes or modifications to the unit without the express approval of the manufacturer will void user authority to operate the equipment.***
- ***Use the supplied AC power cord (when applicable) to supply power to the machine and controllers.***
- ***Please use recommended interconnect cables to connect the machine to controllers and other components.***

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com.
Updates to this user manual may be found at http://www.kramerelectronics.com/manuals.html.
We welcome your questions, comments and feedback.

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